PERCHLORATE IN WATER

PUBLIC HEALTH FACT SHEET

Prepared by the United States EPA and the
US Navy Environmental Health Center
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What is perchlorate? Perchlorate can be man made or naturally occurring. It forms when salts combine with oxygen. Its chemical formula is ClO_4^-. It is commonly found as a part of compounds with other substances, including ammonium perchlorate (AP), potassium perchlorate, sodium perchlorate, and perchloric acid. Perchlorate dissolves easily and moves quickly in groundwater and surface water. It breaks down very slowly in the environment.

What is perchlorate used for? AP is an oxygen-adding compound used for decades as part of the United States (U. S.) national defense and space programs. It is a major component of propellants in solid fuel for rockets and missiles.

AP is also used in the production of explosives and fireworks. It adds the blue color to fireworks displays.

Potassium perchlorate was once used to treat thyroid disorders in people suffering from Graves' disease. Potassium perchlorate is still used today under limited conditions to test for thyroid hormone production in patients.

Additional uses of perchlorate compounds include the production of matches, dyes, lubricating oils, air bag inflators, electroplating, rubber manufacturing, paint production, and chemical fertilizers (especially a widely used fertilizer imported from Chile).

How can I be exposed to perchlorate?
Perchlorates have been made, used, or shipped to companies in at least 44 of the 50 states. It is suspected that the highest potential for the release of perchlorate at DOD sites is during the removal, recovery, and disposal of propellant

from solid rocket motors. AP has a short shelf life, so inventories must be periodically replaced with fresh AP. Thus, relatively large quantities of AP have been disposed of since the 1950's.

Perchlorate was first detected in groundwater and surface water in California and other western states, such as Nevada and Utah, in the early to mid-1980's. There are currently 14 states with confirmed releases of perchlorate in groundwater or surface water.

People who live near areas that have used, tested, manufactured or disposed of perchlorates may be exposed to perchlorates in their drinking water.

Perchlorate is not believed to be absorbed readily through the skin (dermal absorption).

How do I know if perchlorate is in my water?
In 1997 a new technique was developed that can detect extremely low amounts of perchlorate in water. As a result, additional water sources containing perchlorate can be identified. However, this method has not yet been officially accepted by the U.S. EPA for all types of water samples.

How is perchlorate eliminated from water?
Some of the chemical properties of perchlorate make
developing treatment technologies difficult,

especially at
low concentration levels. No one technology or process will likely provide an effective solution for every occurrence of perchlorate contamination in water
supplies. Different technologies may also be developed depending upon the intended use of the treated water (e.g., drinking water versus agricultural application). Research is underway on emerging technologies to meet these new challenges.

Can exposure to perchlorate affect my health? At present, the available data on the health effects of perchlorate are very limited. Human studies using data from medical patients given perchlorate to treat Graves'

disease indicate that high doses can damage the thyroid gland. This can affect metabolism, growth, and development of the human body. In addition, long-term exposure to high levels of perchlorate taken as medication has been linked to potentially serious bone marrow problems. The science of perchlorate and the potential human health impact of exposure to low levels in the parts per billion (ppb) range in drinking water is a developing issue.

No human studies have been completed that address the health effects from drinking water containing the low levels of perchlorate typically found in the U.S.

What are the laws regulating perchlorate? Currently, there are no federal drinking water standards for perchlorate. In March of 1998, perchlorate was placed on the U.S. Environmental Protection Agency (EPA) Office of Water's Contaminant Candidate List (CCL). The Safe Drinking Water Act required EPA to publish the CCL. The list includes compounds that may require regulation, based on their known or suspected presence in public drinking water supplies.

The EPA is conducting on-going research and evaluation of perchlorate health issues. An initial draft human health risk assessment (HHRA) was completed by the EPA in December, 1998. A peer review in February, 1999 determined that the existing information on health effects and toxicity were insufficient, and recommended that additional investigation be conducted. At that time, the EPA requested that a second peer review and evaluation of perchlorate be conducted. This evaluation is tentatively scheduled to be completed in early 2000. The final HHRA will be reviewed at that time. After this review is complete, the EPA is expected to establish a drinking water standard called a maximum contaminant limit (MCL). This limit will set the maximum amount of perchlorate the EPA will allow in drinking water, to ensure the protection of human health.
In the interim, the California Department of Health Services (DHS) adopted an advisory "action level" of 18 ppb of perchlorate in drinking water. The DHS determined that perchlorate concentrations lower than 18 ppb are not considered to pose a health concern for the public, including children and pregnant women.

GLOSSARY

Action Level: A quantitative limit of a chemical, biological, or radiological agent at which actions are taken to prevent or reduce exposure or contact.

DOD: United States Department of Defense.

EPA: United States Environmental Protection Agency.

***Exposure Route*:** the way in which people come into contact with a substance. The main routes are ingestion, inhalation, and absorption through the skin.

***Groundwater*:** water found below surface usually in sands or a rock formation. Much of our domestic water supply is drawn from groundwater wells.

NEHC: Navy Environmental Health Center.

ppb: parts per billion or micrograms per liter (ug/L). An analogy would be - Your rich uncle passes away and leaves you $10 million. However, in counting your inheritance, you discover that 1 cent is missing.

Risk Assessment: an evaluation process that determines the projected health effects caused by exposure to a specific contaminant based on (1) an evaluation of the characteristics and concentration of the contaminant, (2) the exposure pathways present, (3) the projected incidence of human exposure, and (4) toxicity (poisonous) factors.

Toxicology: is the science of poisons

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or visit the EPA perchlorate web site at http://www.epa.gov/OGWDW/ccl/perchlor/perchlo.html